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Fundamenta Entomologiæ :

OR, AN

INTRODUCTION

TO THE

KNOWLEDGE of INSECTS.

BEING A TRANSLATION OF THE

Fundamenta Entomologiæ of LINNÆUS,

FARTHER

Illustrated with Copper Plates and Additions.

By W. CURTIS, APOTHECARY.

L O N D O N :

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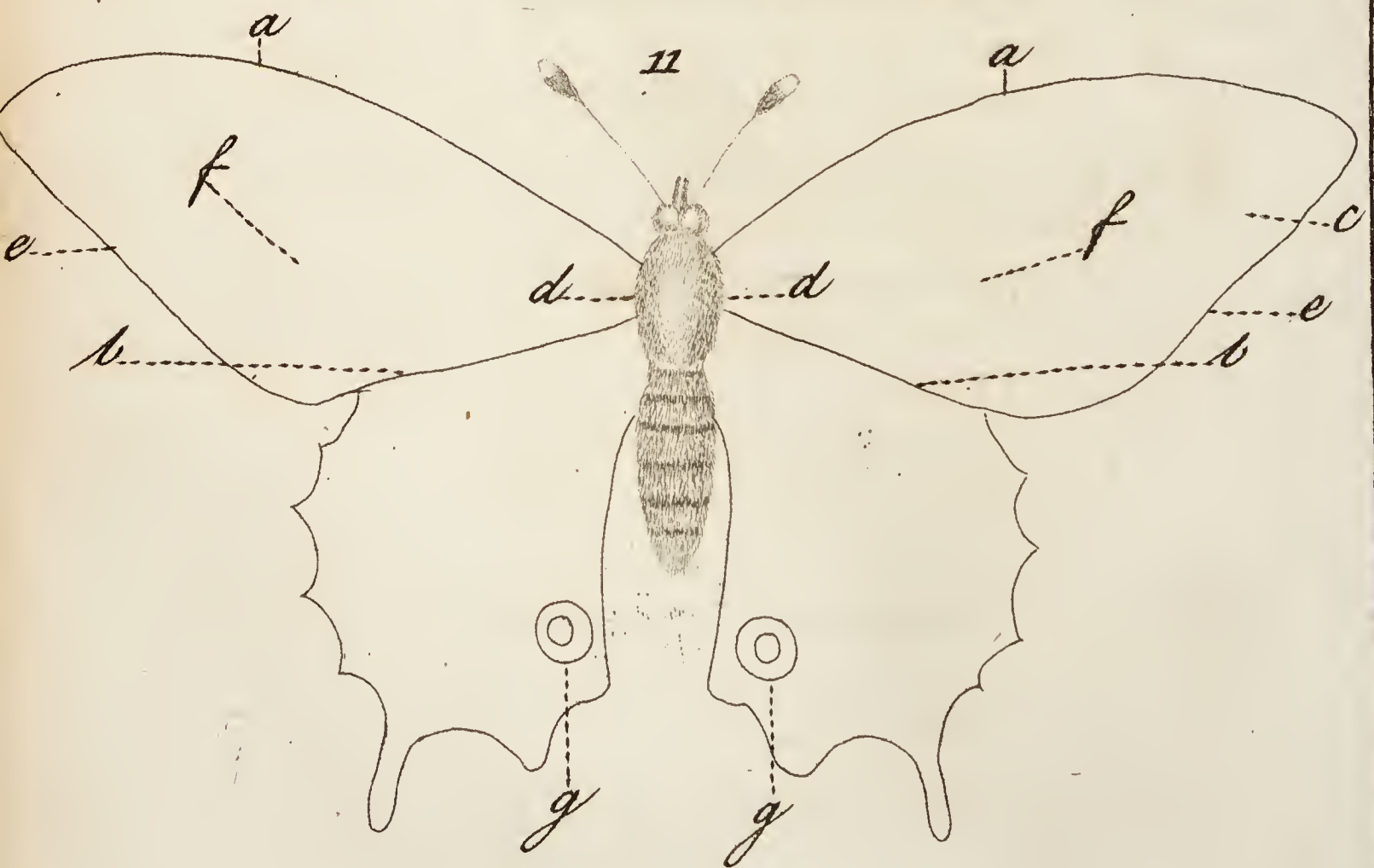
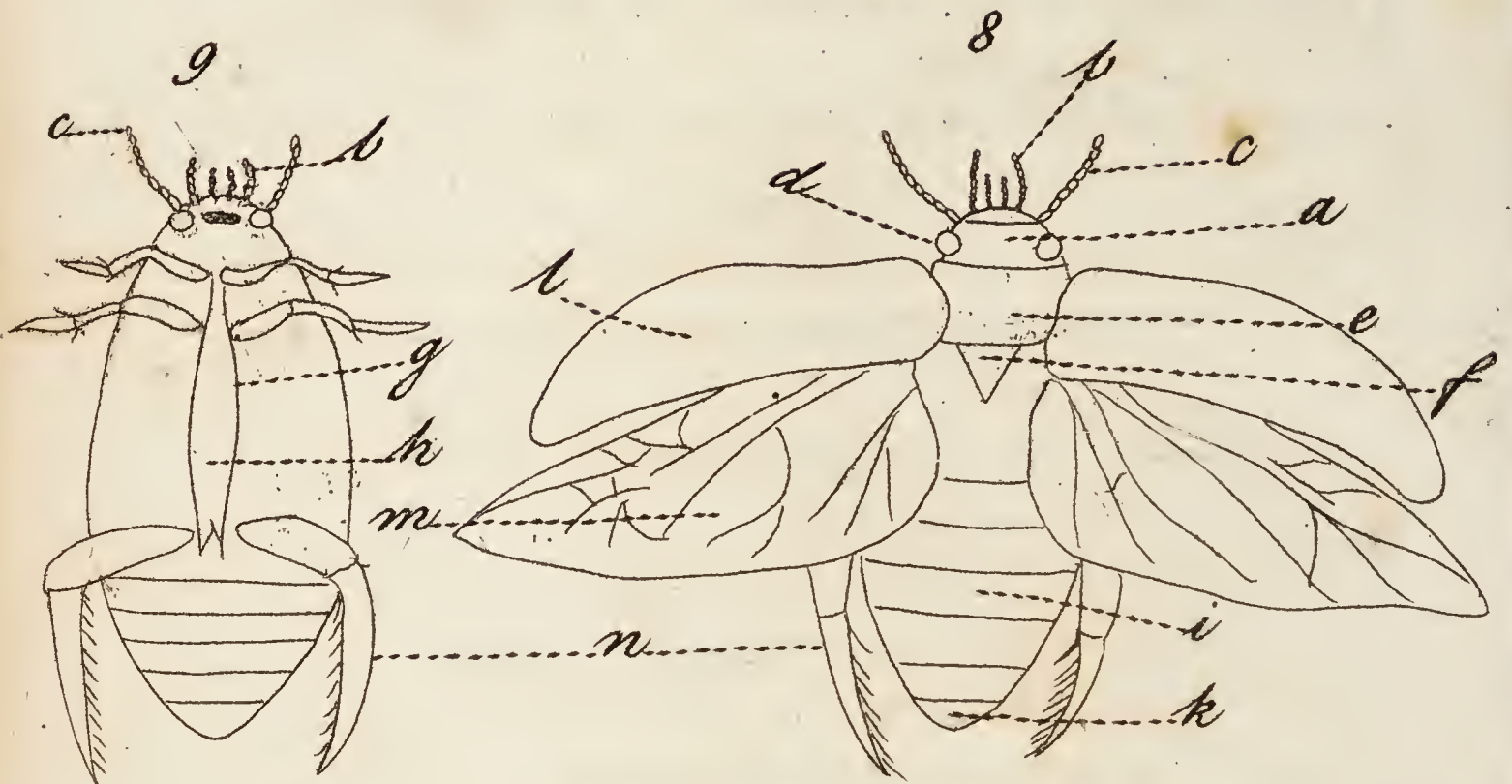
THE piece of which the following is a translation, was originally written by Andrew John Bladh, a pupil of the celebrated Linnæus, and afterwards published in the 7th vol. of Linnæus's *AMOENITATES ACADEMICÆ*. It may therefore be considered if not entirely as Linnæus's own, yet as having the sanction of his approbation.

It afforded me so much pleasure in the perusal, and appeared so well adapted to facilitate

the knowledge of insects, that I was induced to make this translation of it public, in order that others might receive the same entertainment, and this agreeable study become more general.

The addition of the copper plates will, it is presumed, tend to make what is contained in these pages better understood; and by that means still farther answer the end the translator had in view by this publication.

EXPLA-



EXPLANATION of PLATE I.

Fig. 1, 2, 3, 4, 5, 6, in plate i. and fig. 6. in plate ii. represent the several kinds of Antennæ, page 38.

Fig. 1. PECTINATÆ, or Feather'd, as in the *Phalænæ*, *Moths*.

2. PERFOLIATÆ, or Perfoliated, as in the *Dermestes* and *Dytiscus*.

3. FISSILES, or Fissile, divided into Laminæ at the extremity, as in the *Scarabæi*, Beetles.

4. CLAVATÆ, or Club-shaped, as in the *Papilio*, Butterfly.

5. MONILIFORMES, like a Necklace of Beads, as in the *Chrysomela*.

6. SETACEÆ, Setaceous, or Bristle-shap'd, as in many of the *Phalænæ*.

7. ARISTATÆ, fig. 6, plate ii. furnished with a lateral hair, as in the *Fly*.

8-9. *a* Caput, the Head.

b Palpi, or Feelers.

c Antennæ, or Horns.

d Oculi, the Eyes.

e Thorax

f Scutellum, or Escutcheon.

g Pectus, or Breast.

h Sternum, or Breast Bone.

i Abdomen, and its segments.

k Anus.

l Elytra, or Shells.

m Membranous Wings.

Fig. 8-9.

Fig. 8-9. *n* Pedes, or Feet, which are Natatorii.

10. *o* Femur, or Thigh.

p Tibia, or Leg.

q Tarsus, or Foot.

r Unguis, or Claw.

11. *a* The Anterior part of the Wing.

b The Posterior part.

c The Exterior part.

d The Interior part.

e The Margin.

f The Disk, or Middle.

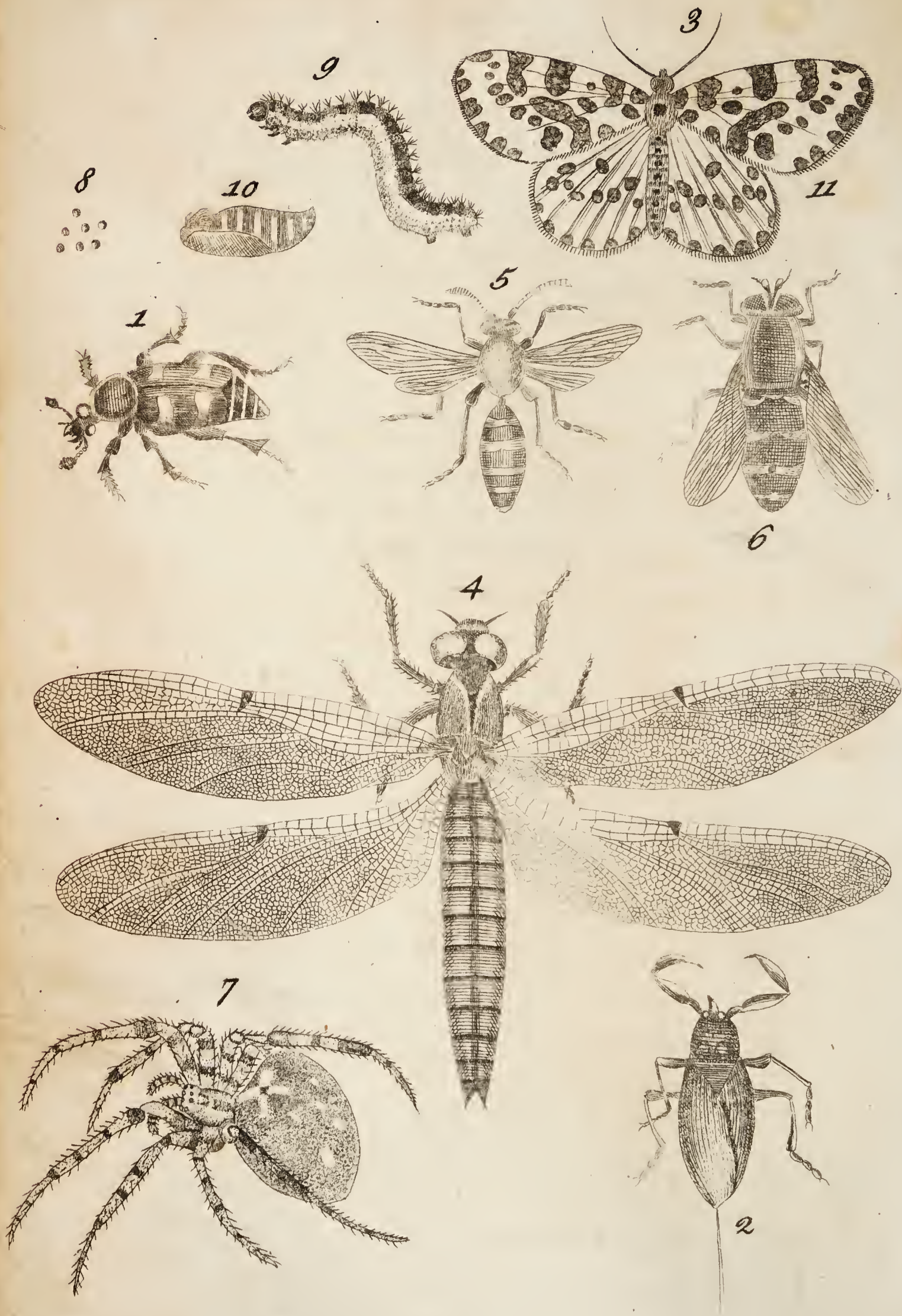
g Oculus, or Eye.

EXPLA-



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EXPLANATION of PLATE II.

Fig. 1, 2, 3, 4, 5, 6, 7, represent the classes of Insects, page 70.

Fig. 1. COLEOPTERA, such as have crustaceous Elytra, or Shells, which shut together, and form a longitudinal future down the back of the insect, as in the Chafer. In most insects of this class the Elytra cover the Abdomen entirely; in others but partially, as in the Earwig, &c. The word is derived from *κολεός*, a Sheath, and *πτερόν*, a Wing.

2. HEMIPTERA, have their upper wings most commonly half crustaceous, and half membranaceous, not divided by a longitudinal future, but incumbent on each other; as in the Water-scorpion and Grasshopper. From *ἥμισυ*, half, and *πτερόν*, a Wing.

3. LEPIDOPTERA, have four wings, cover'd with fine scales in the form of powder or meal; as in the Butterfly and Moth, from *λεπίς*, a Scale, and *πτερόν*, a Wing.

4. NEUROPTERA, have four membranaceous transparent naked wings, generally reticulated, with veins or nerves; tail without a sting, as in the Libellula or Dragon-fly; from *νεῦρον*, a Nerve, and *πτερόν*, a Wing.

Fig. 5.

5. HYMENOPTERA, have four membranous wings, tail furnished with a sting for various purposes ; as in the Wasp and Ichneumon, from *μῆν*, a Membrane or Pellicle, and *πτερόν*, a wing.
6. DIPTERA, Two wings only, and Poisers, as in the House-fly ; from *δύω*, two, and *πτερόν*, a Wing.
7. APTERA, have no wings ; as the Spider, &c. from *ἀ* Without, and *πτερόν*, a Wing.
8. 9. 10. 11. represent the insect in its Egg, Caterpillar, Pupa, and Perfect state.

A N
INTRODUCTION
T O
ENTOMOLOGY.

SECTION I.

THE pleasure and utility of natural history, including its several branches, is so great, that it has engaged the attention of mankind from the remotest period of time: there is scarce an age but what has contributed somewhat to its increase, though in some countries it has not been pursued with the like ardour, nor attended with the

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same success as in others. The all-wise Author of Nature hath implanted in the mind a peculiar thirst for knowledge, which however, from the narrow limits of our intellects, and the infinite variety of objects, is not possessed by all in the same degree. When this principle is rightly directed, it may justly be called a spur to wisdom, otherwise it is apt to precipitate us into doubts and uncertainties, and in attempting many and great things we perform nothing. To say nothing of other pursuits, would it not have been more reasonable for the ancients, who devoted themselves to the study of astrology, and the contemplation of celestial bodies, at an infinite distance, to have investigated the various inhabitants of their own planet, and been more solicitous about things which were really known to exist, than about those

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those whose existence was only probable?

It is the opinion of most Theologists and Philosophers, that the two branches of natural history, zoology and botany, were among the primary studies of our first parents. Botany, if we except the times of barbarism, has every where been cultivated; but zoology in general has lain almost neglected, even to our time; that part more particularly which relates to insects, has, for reasons we shall presently mention, been despised and ill treated. As this science is too extensive to be fully displayed by any one person, my intention is to propose it in as short a manner as possible, by running through its principal heads: Insects exceed other terrestrial animals in number of individuals and species, and taken all together, constitute a larger

bulk. Notwithstanding their contemptible appearance, each of them has its proper business assigned to it in the œconomy and police of nature, whereby they frequently transact the greatest things, and though gradually and slowly, yet by their number they effect what would appear to exceed all expectation and belief.

S E C T. II.

IT was formerly believed that insects were produced by equivocal generation, or from putrefaction, and that the putrified remains of other animals were changed into them; and that infinite mixtures and varieties might thus arise without law or order. This absurd and futile opinion, almost universally prevailed 'till the times of Harvey
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and Rhedi, who, from uncontroverted experiments, proved that the same laws of propagation existed in those as in other animals, and that *every living thing was produced from an egg*. Some of those animals are extremely minute, so as to be scarce visible to the naked eye, as ACARI, (*mites*) THRIPIES, COCCI, PHALÆNA OCCUTELLA, (*a species of moth*) others again are very large, as the MONOCULUS POLYPHEMUS, CANCER GAMARUS, (*lobster*) and some others of the crab kind, SCARABÆUS ACTÆON, (*a species of beetle*) and PHALÆNA ATLAS (*another species of moth*). With regard to their strength, considering their size, it appears prodigious. Excepting aquatic insects, which are *biennial*, most of them are *annual*, and cannot subsist through the winter in our cold climate; but being renewed every spring, they render their species

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perennial: They multiply incredibly, vying even with the fishes in their increase. Reaumur informs us, that one female bee can yearly deposit in the hive forty thousand eggs; the same author also discovered in one fly two thousand young ones: their structure, wonderful mechanism, and shape, display the perfection of the all-wise Creator; in the beauty of their colours, they are not inferior to the finest animals and flowers, to instance the *BUPRESTIS ignita*, *PAPILIO*, *Priamus*, *Helena*, *Menelaus*, and most of the Indian butterflies, and those kind of moths called *Tineæ*. It is therefore matter of admiration that the English and French nobility, who are curious in this part of natural history, have not constructed hot-houses for the Indian Lepidoptera, in which they might subsist during the winter, as they are undoubtedly more pleasing

pleasing to the eye than any other, as appears from the paintings of Clerck and Merian.

S E C T. III.

AS insects furnish but few of the necessaries of life, the ignorant and uncivilized part of mankind have not scrupled to stigmatize the ingenious enquirers after them with the name of fools, as these animals appeared to them altogether contemptible, and deserved to be considered only as punishments inflicted on particular countries for the sins of its inhabitants; forgetting in the mean time that the all-wise Creator, who formed them, created nothing in vain, nothing without its use. But as mankind became more enlightened, the great wonders of nature in these

these small animals began to be observed ; each species was found to be furnished with instruments adapted to keep up a proper proportion in the œconomy of nature ; happily some clear the surface of the earth from impure and superfluous, some the air of fetid and putrid matters, and others muddy and stagnating waters of heterogeneous or filthy mixtures ; they assist in preserving a due proportion among vegetables, by destroying many which are inaccessible to the larger animals.

Different parts of the same plant often afford nourishment to different insects ; some live on the flowers, as the *Curculiones* ; some on the roots ,as the *Leptura* ; and others on the leaves, as the *Phalenæ* ; and as the plants increase, so does the number of their respective inhabitants. Lastly, they carry off
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any superfluous or noxious humour secreted on the surface of animals or vegetables; and their influence will probably be found much greater than it is at present, when societies, similar to those of Peterburgh, Paris, London, Leipfic, Gottingen, &c. vying with each other in discoveries relating to œconomy of nature, come to be established in the several kingdoms and principal cities of Europe. To arrive at a perfect knowledge of this œconomy, every part of the productions of nature must be accurately investigated, and consequently the extensive province of insects: for, notwithstanding their great use in the œconomy we have been speaking of, they are oftentimes extremely troublesome and destructive, and with great difficulty got rid off; but if we understood how to apply them properly, we might use them as

we do cats against mice, and by attending to the design of nature, prevent much damage. Thus house-bugs, the *Phalæna Graminis*, caterpillars which infest gardens, with a thousand others, might easily be destroyed by their natural enemies. To bring this art to some degree of perfection, we must become better acquainted with the plants, &c. on which insects feed, with a variety of other circumstances, which posterity perhaps will be happy in the discovery of. The great advantages which have accrued to mankind from silk-worms and bees, have occasioned so many volumes to be written on them; as would incline one to think the subject exhausted; but there is much room for farther observation. D. Lyonett has lately published 2 vols. in quarto on one insect, the *Phalæna Cossus*, and yet hath still left room for farther

farther contemplation on the subject. In the age succeeding Swammerdam, the art suffered much from the prolixity of writers; the history of each insect was delivered in a verbose and luxuriant stile; this is to be avoided; and the necessary particulars being ascertained, our aim in delivering them should be to unite brevity with perspicuity. The description of those animals is more difficult, as they make their appearance at so many different times, and under such a variety of forms; all insects, except those of the class Aptera and the bed-bug, passing through three metamorphoses, in each of which it is necessary we should know them. We think our knowledge very considerable when we are acquainted with most of the insects of a country in their Fly state, although we are ignorant of one half of their manner of life previous to this state;

state; and the difficulty of acquiring this knowledge is greater than the inattentive are aware of; to instance in the Flea, an insect we are so well acquainted with, and which, like most others, undergoes three transformations or changes before it arrives to perfection; yet not one in a thousand has seen it in its caterpillar or chrysalis state. From a consideration of the many wonders in this part of nature, in order to avoid confusion, I find it necessary, in pursuing what I have farther to say on insects, to follow some natural order of systematic arrangements.

S E C T. IV.

In studying any science, the *names* made use of therein are first to be learnt,
without

without which it would become lifeless, as we should be deprived of all intercourse with learned men. Among former Entomologists, there were some who despised all system, or at least the enumeration and description of the insects of particular countries ; and insisted, that the metamorphoses of insects were solely to be attended to. But certainly method constitutes the life of science ; and we should in vain study natural history, without accurate descriptions ; suppose, for instance, the figures of Reaumur, in his immortal work, in which he illustrated this science in a manner superior to all that went before him, to be so obscure and indeterminate as to convey no idea of what he meant to communicate ; of what use, I pray, would be his infinite discoveries ? But when the specific name of any insect is determined, and
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the synonymous names of Swammerdam, Reaumur, De Geer, and Roefel, are annexed, these authors may be immediately consulted; and what has been the work of many ages, and could scarce be attained by much reading, may be learned from a single work. Indeed, the same confusion which reigned in botany before systems were established, would prevail in this science, unless a system was formed. I therefore judge it most eligible to treat of Entomology in a scientific manner; but previous to our entering on this, it will be proper to lay before the young student such authors as have written on this subject.

SECT.

S E C T. V.

Authors who have written professedly on insects are very few ; the last fifty years have produced nearly double the number of all the preceding ages ; and when they began to be treated of systematically, scarce any branch of natural history had more cultivators, or was pursued with more ardour ; among others may be reckoned Linnæus, Reaumur, De Geer, Roefel, Wilkes, Admiral, Clerk, Ehret, Seba, Harris, Poda, Scopoli, Shultzer, Geoffroy, Gronovius, and Schaeffer. Whereas at the commencement of the last century we had not one treatise entirely Entomological : but about that period this science began to be cultivated ; its progress however was very slow, 'till some
 painters,

painters, prompted by a desire of embellishing their drawings of flowers, delineated thereon some of the most beautiful butterflies ; and thus it was that Hoefnagel, Goedart, Robert, and at length Albin, were allured to a contemplation of insects. Swammerdam was the first who investigated the interior structure of insects ; in which he was so amazingly dextrous, as to demonstrate the parts in the smallest animals with equal clearness as in the larger. In this the immortal Reaumur made a farther progress. Lady Merian was so captivated with the study, as to sail from Holland to Surinam, chiefly to enquire into and observe the metamorphoses of those exquisitely fine Butterflies, with which that country particularly abounds, exposing herself with her daughter to all the dangers of
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a tempestuous ocean, a most singular instance of her zeal for this science !

The minuteness of insects makes it more difficult to have a proper idea of them by description than by drawings coloured from nature, such as are given us by Goedart, Albin, Roefel, Wilkes, Admiral, Merian, Clerk, Ehret, Shaeffer, and Harris.

The principal authors who have treated of insects systematically, are Linnæus, De Geer, Poda, Scopoli, Shultzer, Geoffroy, Gronovius, and Shaeffer. The exotic or extra European insects have never been professedly written on, nevertheless a great number of them are figured in the following works :

Clerkii Icones insectorum rariorum.

Merianæ Insecta Surinamensia.

D.

Brown's

Brown's Civil and Natural History of Jamaica.

Catesbey's Natural History of Carolina.

Sloane's Natural History of Jamaica.

Edwards's Natural History of Birds,
2 vols.

* *Gleanings of Natural History,* 2 vols.

The best authors that have written on particular insects, besides innumerable ones on silk-worms and bees, are *Lister*, *Albin*, and *Clerk de Araneis*, *Rhedi de Pediculis*,

* To these authors may be added the *Illustrations of Natural History*, lately published in two volumes quarto, by our countryman D. Drury: this work may indeed be considered as written professedly on this subject, and contains a greater number of exotic insects, than any other work of the kind.

Those authors to which an asterism is prefixed are added by the translator. And the observations he has made on the works of others, are printed in italic letters.

Pediculis, and *Rhumphius* de Canceris Indicis.

A catalogue of the principal authors that have written on insects, with some observations on their works :

MOUFFET. *Insectorum five minimorum animalium theatrum*, London 1634, folio. This work was begun by Edward Wotton, in the year 1550, continued by Conrad Gefner, enriched by Thomas Penny, and finished by Mouffet; it is embellished with wooden cuts. *There is a translation of it into English, by Edward Topsell, 1658.*

ALDROVAND. *Ulyssis Aldrovandi animalia infecta*. Bonon. 1602, et 1638, folio; written in a loose manner, wooden cuts; it also contains the insects of Mouffet.

JOHNSTON. *Johannis Johnstoni Histor. Natural. de infectis*. Frankf.

1653, folio. A plagiary from Aldrovand, with copper plates engraved by himself.

HOEFFNAGEL. Jacobi Hoeffnagel Icones insectorum, 1630, in quarto.

GOEDART. Johannis Goedartii metamorphoses insectorum. Mediol. 1662, octavo. This is written in the Dutch language, and the cuts are coloured. *There is also an edition of it in French, and likewise in Latin, by M. Lister, with great additions.*

HOOKE. Roberti Hooke Micrographia. London, 1665, folio, tab. 38.

RHEDI. Francisci Rhedi experimenta. Florent. 1668, quarto. Animalia viva in vivis Florent. 1684, 12mo.

BLANCARD. Stephani Blancardi theatrum insectorum (Schouburgh van de Rupen) Amst. 1668, octavo.

SWAMMERDAM. Johannis Swammerdamii historia insectorum generalis. Ultraj.

Ultraj. 1669, quarto. Biblia Naturæ
Lugd. Batav. 1737, 2 vols. folio.

LISTER. Martini Listeri histor. animal. Angliæ. Londoni 1678, quarto. This work treats principally of the English spiders, and by way of appendix explains some plates published at the end of his edition of Goedart.

MERIAN. Mariæ Sybillæ Merian Erucarum Ortus. Norimberg 1678, quarto, with cuts coloured, and not coloured. Most of the Lepidopteræ here described are delineated in their caterpillar and chrysalis state. On her return from Surinam, this lady published her splendid work, the Insecta Surinamensia, which is seldom to be met with coloured.

LEWENHOEK. Antonii Lewenhoeckii Anatomia. Londini 1687, quarto. Epistolæ Delph. 1619, quarto. Microscopical.

PETIVER.

PETIVER. Jacobi Peteveri Museum. London 1695, 8vo. without cuts. Gazophylacium 1702, folio, a great number of cuts, and many of exotic insects.

RAY. Johannis Raii historia insectorum. Londini 1720, quarto. This work was published after the author's decease, and is particularly valuable for the excellent descriptions of insects which it contains.

FRISCH. Johannis Leonardi Frisch descriptiones insectorum (Beschreibung von insecten in Teuschland) Berol. 1720, quarto, 13 parts, 38 plates, with many figures. It is written in the German language, and is a work of great merit.

ALBIN. Eleazar Albin. historia insectorum Angliæ, London 1720, quarto. This work contains 100 plates coloured.

— His-

———— Historia Araneorum, London, quarto, table 49.

BRADLEY. Works of nature by Richard Bradley. London 1721, quarto.

REAUMUR. Ren. Ant. Reaumere histoire des insectes. Paris 1734, quarto, 5 vols. with copper plates.

LINNÆUS. Carol. Linnæi Equit. systema naturæ. Lugd. Batav. 1736, folio. Holm. 1767, octavo, with the synonymous names of other authors. Fauna Suecica. Holm. 1761, octavo, editio 2da. Museum Regina. Holm. 1764. octavo, with descriptions.

ROESEL. Aug. Johan. Roessel Insecten Belustigung. Norimb. 1746. 4 vols. plates beautifully coloured.

WILKES. The English Butterflies, by Benjamin Wilkes, 4to. 125 plates finely coloured.

DE GEER. Caroli de Geer Histoire des Insectes. Holmiæ 1752. 2 vols. 4to. with neat plates.

ADMIRAL. Jacob Admiral Waarmingen. Amsterdam, folio.

CLERK. Caroli Clerkii Icones Insectorum rariorum. Holm. 1759. 4to. Part I. 16 plates, 61 figures. Part the second. Holm. 1764. 4to. 17 plates, 55 figures. The cuts in this work are elegantly coloured.

EHRET. Icones Plantarum. Lond. folio. Insects interspersed.

PODA. Nicol. Podæ Insecta Græcensia. Græc. 1761. 8vo. 2 vol. This contains the insects of Greece, arranged according to the system of Linnæus.

SCOPOLI. Joh. Anth. Scopoli Entomologia Carniolica. Wienn. 1763. 8vo. An enumeration and description of the insects of Carniola, after the Linnæan system. *An excellent book.*

SULT-

SULTZER. J. H. Sultzer Kenzeiken der Insecten. Zurich 1761, quarto, 24 plates in the Linnæan manner.

GRONOVIIUS. Laur. Theod. Gronovii, Zoophylacii fasciculus secundus. Leid. 1764, fol. four plates. After the Linnæan system, with synonyma and descriptions; it contains 600 species, many of which are foreign.

SEBA. Albert. Sebæ Thesaurus Naturæ, vol. 4. Amst. 1765, folio, tab. 100.

* GEOFFROY. Histoire abrégée des Insectes qui se trouvent aux environs de Paris, 2 tom. 4to. Paris 1762.

SCHAEFFER. Joh. Christ. Schaeffer Icones Insectorum. Ratisb. 1767, 4to. 100 plates coloured.

* ————— Fundamenta Entomologiæ, quarto, plates coloured.

HARRIS. The Aurelian, or a Natural History of English Insects, namely
E Moth

Moths and Butterflies, by Moses Harris. Lond. folio, cuts coloured, Lond. 1766.

* BRUNNICH. M. Th. Brunnichii Entomologia sistens Insectorum tabulas systematicas, cum introductione et iconibus. Hassniæ 1764. A kind of introduction to the study of insects, remarkable for its elegance and conciseness, with an explanatory plate.

* LECHE. Novæ Insectorum Species, quas dissertationis academicæ loco, preside Johanne Leche, proposuit Isaacus Uddman. Aboæ 1753, 4to. cum figuris.

* DRURY. Illustrations of Natural History, by D. Drury, English and French, 2 vol. 4to. London 1771. The first volume contains a great number of exotic insects, excellently drawn, coloured, and described, most of which are not figured by any other author; the second volume, which will soon
make

make its appearance, consists entirely of non-descripts, executed in the same masterly manner.

* SEPP. *Beschouwing der Wonderen Gods in de minstgeachtte Schepzelen of Nederlandsche Insecten*, 4to. 1762, by Christian Sepp. Amsterdam. This work, which is now publishing in numbers in Holland, contains a great number of the more rare moths and butterflies of that country, but which are found in many other parts of Europe. Each insect is delineated in its egg, caterpillar, chrysalis, and fly state, and executed in a manner which reflects the greatest honour on the artist; we are at a loss which most to extol, the accuracy of the drawing, the delicacy of the engraving, or the softness and justness of the colouring; the whole is finished in a manner exquisitely beautiful, greatly superior to the paintings even of Roessel or Merian.

* FORSTER. *Novæ Insectorum Species, centuria prima, octavo, 1771, London.* A systematic description of an hundred species of insects found in Great Britain, and elsewhere, not inserted in the 12th edition of Linnæus's *Systema Naturæ*.

S E C T. VI.

As insects are endowed with the various powers of creeping, flying, and swimming, there is scarce any place, however remote and obscure, in which they are not to be found. The great confusion which appeared to the ancients to arise from their number, made them never dream of reducing them to any system. Swammerdam, that indefatigable enquirer into nature, observed that their metamorphoses were
divided

divided by nature into several states or orders. Their external appearance also carried with it some mark of distinction, so that entomologists called all those of the Coleoptera class, Scarabæi (beetles;) those of the Lepidoptera, Papilionæ; and those of the Gymnoptera class that had two wings only, Muscæ (flies;) those of the same class that had four wings, were called Apes (bees). No farther progress was made in the systematic part of this science till the time of Linnæus. He was the first that undertook to determine the Genera, and assign them their proper characters in the *Systema Naturæ*, and thus reduced this science to a systematic form. This system, in subsequent editions, was considerably enriched and amended by him, insomuch that the science of insects now shines forth in its full lustre. He it was who first instituted

stituted natural Orders, and reduced them into Genera by expressive names; determined an infinite number of species in the *Fauna Suecica*, and *Museum Reginae*, collected with incredible pains the synonymous names of the various authors who had written on them; and lastly added their descriptions, and the places in which they were to be found. So that the system of this illustrious author will lead any person, without the assistance of a master for the most part, easily to ascertain the name of any insect he may meet with. Before his time scarce more than 200 insects were known; whereas, in the last edition of his system, he has determined the names of nearly 3000 distinct species. The Systematic Naturalists, in the more Southern parts of Europe, excited by his example, have diligently investigated the insects of their respective countries,

countries, so that we are become pretty well acquainted with the greatest part of the European insects in their perfect or fly state. From the insects collected in the Southern parts of France (more than 300 of which were sent to our President, by the most noble Soubry, Treasurer of France, residing at Lyons) the number of species was considerably increased. A cabinet full of the insects of Barbary was also sent him from the accomplished Brander, Consul at Algiers; and a very considerable number from Carolina, in America, was received from the very ingenious Garden, which greatly increased the number of Arctic or Northern insects. Our knowledge of the Tropical or Indian insects, as they are called, is very limited. The larger sort of the Lepidoptera, preserved in the cabinets of the curious, and those collected

lected at Surinam by Rolander, and sent to the cabinet of De Geer, being the principal of what we are acquainted with. The Antarctic insects we were totally unacquainted with, excepting those ten which Petiver delineated in his *Gazophylacium*, till the illustrious Tulbagh, Governor of the Cape of Good Hope, sent a fine collection of them to our learned President. Should the Indian and Antarctic insects ever come to be pretty generally known, they will doubtless vie with plants in number, though they will probably never attain to the number which Muschenbroek apprehended in his Oration.

SECT.

S E C T. VII.

Whoever is desirous of attaining a systematic knowledge of insects, ought primarily to be solicitous about acquiring the terms made use of in the science, that so he may be able rightly to denominate every part of an insect. This then, as the first rudiments of the science, we shall begin with. The student is first to know what an insect is, lest he mistake hippocampi, and other amphibious animals, for them, as was formerly done, or confound them with the vermes, which Linnæus first distinguished from insects, and which differ as essentially from them as the class mammalia do from birds. Every insect is furnished with a head, antennæ, and feet, of all which the vermes are destitute. All insects have six or more feet ; they

F

respire

respire through pores placed on the sides of their bodies, and which are termed spiracula; their skin is externally hard, and serves them instead of bones, of which they have internally none. From this definition, the *acus marina* is evidently no insect. But the antennæ placed on the fore part of the head, constitute the principal distinction. These are jointed and moveable in every part, in which they differ from the horns of other animals; they are organs conveying some kind of sense; but we have no more idea what this kind of sense is, than a man has, who, without eyes, attempts to determine the particular action of the rays of light on the retina of the eye, or to explain the changes which from thence take place in the human mind. That they are the organs of some kind of sense, is apparent from their perpetually moving them forward;

yet

yet the hard crust with which they are invested, and their shortness in flies and other insects, would induce one to believe them not to be the organs of touch: that they are tubular, and filled with air, and some kind of humour, appears from the antennæ of butterflies immersed in water. To come now to the terms of the art. A knowledge of the external parts of the body is first to be established, which, after the method of anatomists, we divide into head, trunk, abdomen, and extremities.

S E C T. VIII.

Caput, the head. This part in insects is without brain. The difference between the brain and spinal marrow consists in the former being a medullary part organized. We do not deny the

existence of a medullary thread in the heads of insects, but we never could discover it to be organized; hence the *hippobosca equina*, or horse fly, will live, run, nay even copulate, after being deprived of its head; to say nothing of many others which are capable of living a long while in the same situation. As they are not furnished with ears, we apprehend them incapable of hearing; as we can no more conceive that sense to exist without ears, than vision without eyes. They are nevertheless susceptible of any shrill or loud noise, as well as fishes, but in a manner different from that of hearing. We are also dubious if they have the sense of smell, no organ being found in them adapted to that purpose; they nevertheless perceive agreeable and fetid effluvia, but in a manner wholly unknown to us. Many insects have no tongue, nor make
any

any found with their mouth ; but for this purpose, some use their feet, others their wings, and others, some elastic instrument with which they are naturally furnished. Most insects have two eyes, but the gyrinus has four, the scorpion six, the spider eight, and the scolopendra three. They have no eyebrows, but the external tunic of their eyes is hard and transparent like a watch-glass ; their eyes have no external motion, unless it be in the crab. They consist for the most part of one lens only ; but in those of the butterfly, dipteræ, and many of the beetles, they are more numerous. Pugett discovered 17,325 lenses in the cornea of a butterfly, and Lewenhoeck, 800 in a fly.

Antennæ, *plate 1. a.* These are in general two (unless 4 are allowed to some kind of crabs) and placed on the
fore-

fore-part of the head ; they are peculiar to insects, and are plainly distinguishable from the tentaculæ of the vermes in being crustaceous ; and from the palpi of insects, which are more numerous, placed near the mouth, and are sometimes wanting. As the antennæ are of great moment in distinguishing the various kinds of insects, we shall enumerate and explain the several different forms of them.

Setaceæ, are those which grow gradually taper towards the extremity, as in plate 1. fig. 6.

Filiformes, such as are of the same thickness throughout.

Moniliformes, are filiform, like the preceding, but consist of a series of round knobs, like a necklace of beads, as in plate 1. fig. 5.

Clavatæ,

Clavatæ, such as gradually increase in size toward the extremity, as in plate 1. fig. 4.

Capitatæ, are *clavatæ*, but have the extremity somewhat round.

Fissiles, are *capitatæ*, but have the capitulum, or knob, divided longitudinally into 3 or 4 parts, or laminæ, as in the scarabæi, plate 1. fig. 3.

Perfoliatæ, are also *capitatæ*, but have the capitulum horizontally divided, as in the dermestes, plate 1. fig. 2.

Pectinatæ, so called from their similitude to a comb, though they more properly resemble a feather, as in the moths and elateres. This is most obvious in the male, plate 1. fig. 1.

Aristatæ, such as have a lateral hair, which is either naked or furnished with lesser hairs, as in the fly, plate 2. fig. 6.

Breviores,

Breviores, those which are shorter than the body.

Longiores, those which are longer than the body.

Medioces, those which are of the same length with the body ; all three of which varieties are distinguishable in the cerambyces.

Palpi, or feelers, so first named by Linnæus, resemble filiform, articulated, moveable antennæ. They are most commonly four in number, sometimes six ; they are sufficiently distinguished from antennæ, in being naked, short, and always placed at the mouth, see plate 1. fig. 6.

Os, the Mouth, is generally placed in the anterior part of the head, extending somewhat downwards. In some insects, it is placed under the breast, as in the chermes, coccus, cancer, (crab) and curculio.

Rostrum,

Rostrum, or Proboscis, is the mouth drawn out to a rigid point : in many of the hemiptera class it is bent downward toward the breast and belly, as in the cicada, nepa, notonecta, cimex, (bug) aphid, and remarkably so in some curculiones.

Maxillæ, the Jaws, are two in number, sometimes four, and at other times more ; they are placed horizontally ; the inner edge of them in some insects is serrated, or furnished with little teeth.

Lingua, the Tongue, in some insects is taper and spiral, as in the butterfly ; in others it is fleshy, resembling a proboscis ; and tubular, as in the fly.

Labium Superius, the upper Lip, this is situated above the jaws, as in the scarabæus and gryllus.

Stemmata, or Crown, are three smooth hemispheric dots, placed generally on the top of the head, as in most of the hymenoptera, and others; the name was first introduced by Linnæus.

* * Truncus, the Trunk, is that part which comprehends the breast or thorax; it is situated between the head and abdomen, and has the legs inserted into it, that its parts may be distinctly determined; it is divided into *Thorax*, *Scutellum*, and *Sternum*.

Thorax, the Thorax, (plate 1. c.) is the back part of the breast; it is very various in its shape, and is called *Dentatus*, when its sides are armed with points; *Spinosus*, when its back is furnished with them, as in the *cerambyx*; and *Marginatus*, having its margin laterally dilated, as in the *filpha* and *caf-fida*.

Scutellum,

Scutellum, or Efcutcheon, (plate 1. *d.*) is the posterior part of the thorax; it is frequently triangular, and appears to be divided from the thorax by an intervening future, as in most of the coleoptera.

Sternum, the Sternum, is situated on the inferior part of the thorax; it is pointed behind in the elateres, and bifid in some of the dytisci.

Abdomen, the Abdomen, (plate 1. *e.*) is in most insects distinct from the thorax; it is the posterior part of the body of the insect, and is composed of a number of annular segments, which serve occasionally to lengthen or shorten it, and to contain the organs of chylification, &c.

Spiracula, are little holes or pores, placed singly on each side of every seg-

ment of the abdomen ; through these the insect breathes ; and if oil be applied so as to stop them up, it proves fatal to most of them.

Tergum, the Back, is the superior part of the abdomen.

Venter, the Belly, is the inferior part.

Anus, is the posterior part of the abdomen, perforated for the evacuation of the excrement. This part also frequently contains the organs of generation.

*** Artus, the limbs, are the various instruments of motion.

Pedes, the Legs, are generally six ; there is an exception to this, however, in the class Aptera, many of which have eight, as Acari (Mites) Phalangii ; most of the Aranei, (Spiders) Scorpiones

piones, (Scorpions) and Cancrī (Crabs.) The Oniscus has 14, and the Juli and Scolopendri still more.

The first joint of the leg, which is generally thickest, is called *Femur* (plate 1. f.) the second, which is generally of the same size throughout, *Tibia*, (g.) the third, which is jointed, is distinguished by the name of *Tarsus* (h.); and the last, which in most insects is double, by that of *Unguis* (i.). The legs of insects, in general, are named from the various motions they produce:---

Cursorii, from that of running, which are the most numerous; *Saltatorii*, from that of leaping; *Natatorii*, from that of swimming, &c.

In the *Saltatorii*, the thighs are remarkably large, by which means they are able to leap to a considerable distance, as in the *Gryllus*, (Grasshopper) &c. In those of the *Natatorii*, the feet are flat, and edged with hairs, which answer the purpose of oars in assisting them to swim, as in the *Dytiscus*.

Mutici, are such feet as have no claws.

Chelæ, or Claws, are the fore-feet enlarged towards their extremities, each of which is furnished with two lesser claws, which act like a thumb and finger, as in the Crab.

Alæ, Wings, these are the instruments which enable them to fly; they are membranous, and undivided, except in the instance of the *Phalænæ Alucitæ*, in which they are in part divided:

vided. Most insects have four ; the *Diptera*-class, and the *Coccus*, however, have two only.

The wing is divided into its *superior* and *inferior* surfaces ; its *anterior* part (see explanation of plate 1.) in a butterfly, is that towards the anterior margin, or next to the head ; its *posterior* part, that towards the Anus ; its *exterior* part, that towards the outer edge ; and the *interior*, that next the Abdomen.

They are called *plicatiles*, when they are folded at the time the insect is at rest, as in the wasp ; opposite to these are the *planæ*, which are incapable of being folded.

Erectæ, such as have their superior surfaces brought in contact when the insect is at rest, as in the *Ephemera*, *Libellula Puella*, and *Virgo*, and *Papiliones*, (butterflies.)

Patentes,

Patenæ, which remain horizontally extended when the insect is at rest, as in the *Phalænæ Geometræ*, and most of the *Libellulæ*.

Incumbentes, such as cover horizontally the superior part of the abdomen when the insect is at rest.

Deflexæ, are *Incumbentes*, but not horizontally, the outer edges declining toward the sides.

Reversæ, are *Deflexæ*, with this addition, that the edge of the inferior wings projects from under the anterior part of the superior ones.

Dentatæ, in which the edge is serrated, or scolloped.

Caudatæ, in which one or more projections in the hinder wings are extended into processes.

Reticulatæ, when the vessels of the wings put on the appearance of network,

work, as in the Hemerobius Perla; the two anterior wings generally become *superior*, and the posterior ones *inferior*, in Moths, when their wings are closed; but the anterior wings are called *primary*, and the inferior ones *secondary*, in butterflies, as they cannot with propriety be called inferior when the wings are erect.

Colores, the *Colours*, these are self-apparent; but according to their several shapes, they take the different names of *Punctæ*, *Dots*; *Maculæ*, *Spots*; *Fasciæ*, *Bands*; which frequently run across, and sometimes surround the edge of the wings. *Strigæ*, *Streaks*, are very slender, *Fasciæ*; and *Lineæ*, *Lines*, which are longitudinally extended.

H

Ocellus,

Ocellus, is a round spot, containing a lesser spot of a different colour in its center.

Stigmata, another term lately introduced by Linnæus, signifies the spot, or anastamosis, in the middle of the wing near the anterior margin; it is conspicuous in most of the Hymenoptera and Neuroptera, and even in the Coleoptera. The single or double kidney-shaped spot, situated in the same part of the anterior wings, and frequently occurring in the Phalænæ Paganæ, is distinguished likewise by the name of *Stigma*.

Elytra, (in the singular number *Elytron*) the Upper Wings, which are of a hard substance, in some degree resembling leather, and which in most insects are of a very hard texture, but in others flexible, are called *Elytra*; their superior surface is generally convex,

vex, their inferior one concave. When the insect flies they are extended, and shut when it rests, closing together, and forming a longitudinal future down the middle of the back, as in the Coleoptera.

They are of various shapes.

Abbreviata, when shorter than the Abdomen.

Truncata, when shorter than the Abdomen, and terminating in a transverse line.

Fastigiata, when of equal, or greater length than the Abdomen, and terminating in a transverse line.

Serrata, when the exterior margin towards the apex is notched or serrated, as in some of the Buprestes.

Spinosa, when their surface is covered with sharp points, or prickles.

Scabra, when their surface is so uneven as to grate against the fingers.

Striata, when marked with slender longitudinal furrows.

Porcata, when with elevated longitudinal fulci, or ridges.

Sulcata, when these ridges are concave.

Hemelytra, when the superior wings are of a middle substance betwixt leather and membrane; either totally so, as in the *Grylli*; or partially so, as in the *Cimices*, *Nepæ*, and *Notonectæ*. These are commonly distinguished by the name *Hemiptera*.

Halteres, Poisers, (a term also introduced by Linnæus) are little heads placed on a stalk or peduncle, most frequently under a little arched scale. They are found only in the class *Diptera*, and appear to be nothing more than the rudiments of the hinder wings.

Cauda, the tail, in most insects is,

Simplex,

Simplex, simple, capable of being extended, and again drawn back at pleasure; in the Crab and Scorpion, however it is,

Elongata, elongated, or lengthened out.

Setacea, bristle-shaped, or taper, as in the Raphidia.

Triseta, consisting of three bristles, as in the Ephemera.

Furcata, being forked, as in the Podura.

Forcipata, resembling a pair of forceps, as in the Forficula.

Foliosa, resembling a leaf, as in the Blatta, Grylli, and some species of Cancrion.

Telifera, such as are armed with a dart or sting, as in the Scorpion and Panorpa.

Aculeus, an instrument with which they wound, and at the same time in-

still

still a poison; with such the Bee, Wasp, Scorpion, &c. are furnished.

Sexus, the Sex. The same difference of sex exists in insects as in other animals, and they even appear more disposed to increase their species than other animals; many of them, when become perfect, seeming to be created for no other purpose but to propagate their species. Thus the silk-worm, when it arrives at its perfect or Moth-state, is incapable of eating, and can hardly fly: It endeavours only to propagate its species; after which the male immediately dies, and the female, as soon as she has deposited her eggs.

In many insects, the male and female are with difficulty distinguished; and in some they differ so widely, that an unskilful person might easily take the male, and female, of the same insect

fect for different species; as for instance, in the *Phalæna Humuli*, *Piniaria*, *Rufula*; each sex of which differs in colour. This unlikeness is still more apparent in some insects, in which the male has wings, and the female none, as in the *Coccus*, *Lampyris*, *Phalæna Antiqua*, *Brumata*, *Lichenella*. And as most insects remain a long while in copulation, as we may see in the *Tipula*, and *Silk-worm*; the winged males fly with the wingless females, and carry them about from one place to another, as in the *Phalæna Antiqua*. It is, however, no certain rule, that when one insect of the same species is found to have wings, and the other to be without, the former must necessarily be the male, and the latter the female. The *Aphides*, for instance, are an exception; and besides these, individuals of both sexes, and of the same species,

are

are found without wings, as the Carabi Majores, Tenebriones, Meloes, Cimices. The Gryllus Pedestris is likewise destitute of wings, and might have passed for a Gryllus in its pupa state, had it not been seen in copulation; for it is well known that no insect can propagate its species, till it arrives at its last or perfect state.

“ Pleraque insectorum genitalia sua
 “ intra anum habent abscondita, et penes solitarios, sed nonnulla penem
 “ habent bifidum: Cancris autem et
 “ Aranei geminos, quemadmodum nonnulla amphibia, et quod mirandum
 “ in loco alieno, ut Cancer, sub basi caudæ. *Araneus mas* palpos habet
 “ clavatos, qui penes sunt, juxta os
 “ utrinque unicum, quæ clavæ sexum
 “ nec speciem distinguunt; et Fœmina
 “ vulvas suas habet in abdomine juxta
 “ pectus;

“ pectus ; heic vero si unquam vere
 “ dixeris : res plena timoris amor, si ex
 “ nim procius in auspicato accesserit, fœ-
 “ mina ipsum devorat, quod etiam fit,
 “ si non statim se retraxerit. Libellu-
 “ la fœmina genitale suum sub apice
 “ gerit caudæ, et mas sub pectore, adeo
 “ ut cum mas collum fœmina forcipe
 “ caudæ arripit, illa caudam suam pec-
 “ tori ejus adplicet, sicque peculiari ra-
 “ tione connexæ volitent.”

Besides these of the male and female,
 a third sex exists in some insects, which
 we call *Neuter* : As these have not the
 distinguishing parts of either sex, they
 may be considered as eunuchs or infer-
 tile.

We know of no instance of this kind
 in any other class of animals, nor in ve-
 getables, except in the class Syngene-
 siæ, and in the Opulus. This kind of

sex is only found among those insects which form themselves into societies, as Bees, Wasps, and Ants; and here these kind of eunuchs are real slaves, as on them lies the whole business of the œconomy, while those of the other sex are idle, only employing themselves in the increase of the family. Each family of bees have one female only (called the queen) many males, and an almost innumerable quantity of Neuters. Of those, the Neuters (whose antennæ have eleven joints) do the working part; they extract and collect honey and wax, build up the cells, keep watch, and do a variety of other things. The males, whose antennæ consist of 15 joints, do no work; they serve the female once, and that at the expence of their lives; they may be considered in the light of a set of Parasites, or Cecisbei; but as soon

as their business of impregnation is over, they are expelled by their servants the neuters, who now shake off the yoke, but yet pay all due respect to their common mother the queen. The same œconomy nearly takes place in Wasps, where the young females, which are impregnated in the autumn, live through the winter, and in the spring propagate their species ; but the queen, together with all the males, perish in the winter.

Among ants, the neuters form a hill in the shape of a cone, that the water may run off it, and place those which are in the pupa state, on that side of it which is least exposed to the heat of the sun. At a considerable distance from these are found the habitations of the males, and females, to whom the most ready obedience is yielded by the neu-

ters, till a new off-spring succeeds, and then they oblige them to quit their habitations. But those ants which live entirely under ground, provide better for themselves in this respect; for a little before their nuptials, they quit their habitation of their own accord, and after swarming in the manner of bees, they copulate in the air; and each retiring to some new habitation, founds a new family.

No hermaphrodites have as yet been discovered among insects. There is something very singular, however, in the propagation of the Aphides. A female Aphis once impregnated, can produce young, which will continue to produce others without any fresh impregnation, even to the 5th progeny; afterwards a new impregnation must take place.

The

The male insects, like male Hawks, are always smaller than the females.

In the propagation of their species they are remarkably careful, so that it is with the greatest difficulty that flies are kept from depositing their eggs on fresh meat; the cabbage Butterfly from laying them on cabbage, and other insects from depositing them in the several places peculiar to each. The *Scarabæus Pilularius* and *Carnifex*, are deserving of our attention, as they afford a mutual assistance to each other; for when the female has laid her eggs in a little ball of dung, the males, with their feet, which are axiform, assist the female to roll it to some suitable place, as Aristotle and Pliny formerly, and Loeffling has lately observed.

It is very wonderful to observe, that in the *Coccus* and *Oniscus*, the female has no sooner brought forth her young,

young, than she is devoured by it ; and that the Sphex should be able so readily to kill the caterpillar of a Moth, then bury it in the earth, and there deposited her eggs in it. Nor can we without admiration behold the same species of Aphis, which was viviparous in the summer, become oviparous in the autumn.

Almost innumerable examples might be brought of the singularities in the eggs of insects ; we shall, however, only mention those of the Hemerobius, which are deposited on a footstalk ; those of the Phalæna Neustria, which are placed regularly in a ring round the branch of some tree, and the compound eggs of the Blatta.

Metamorphosis. There are no insects, except those of the Aptera class, but what are continually undergoing some transformation.

transformation. This renders the science much more extensive, but at the same time is greatly conducive to finding out the natural orders. Insects change first from the (Ovum) egg into the (Larva) Caterpillar or Maggot, then into the (Pupa) or Chrysalis, and lastly into the (Imago) Fly or Perfect state. [See plate 2.] During each of these changes, their appearance differs as much as night and day.

The insect, as soon as it came out of the egg, was by former entomologists called Eruca; but as this is synonymous with the botanic name *Sisymbrium*, it was changed by Linnæus, for the term Larva, a name expressive of the insect's being in this state, as it were, masked, having its true appearance concealed. Under this mask or skin the intire insect, such as it afterwards appears

appears when perfect, lies concealed, enveloped only in its tender wings, and putting on a soft and pulpy appearance; infomuch that Swammerdam was able to demonstrate the Butterfly with its wings to exist in a Caterpillar, though it bore but a faint resemblance to its future perfection. The insect, therefore, in this state, undergoes no other alteration but the change of its skin.

The Larvæ are, for the most part, larger than the insect when perfect, and are very voracious. The Caterpillar of the cabbage Butterfly eats double what it would seem to require from its size; but its growth is not adequate to its voracity.

Pupa. The insect in this state was formerly called Chrysalis, or Aurelia; but as the appearance of gilding is confined to a few Butterflies only, the term of Pupa has been adopted in its stead, because

because the Lepidoptera, especially, resemble an infant in swaddling clothes ; and in this state all, except those of the Hemiptera class, take no nourishment.

Imago, is the third state. This name is given by Linnæus to this third change, in which the insect appears in its proper shape and colours ; and as it undergoes no more transformations it is called perfect. In this state it flies, is capable of propagating its species, and receives true antennæ ; which before, in most insects, were scarce apparent.

As the shape of the Pupa is different, in different classes of insects, it assumes different names ; thus it is called,

Coarctata, when it is round, and as it were turned, without the least resemblance of the structure of the insect, as in the Diptera.

Obteſta, when it conſiſts as it were of two parts, one of which ſurrounds the head and thorax, and the other the abdomen.

Incompleta ; in this they have wings and feet, but are not capable of moving them, as in moſt of the Hymenoptera.

Semicompleta ; theſe walk or run, but have only the rudiments of wings.

Completa, in which they immediately obtain the perfect form of the inſect, without undergoing any more change, as in thoſe of the Apteræ claſs, except only the Flea.

The *Bed Bug* alſo belongs to this claſs.

The *Spider* undergoes frequent transformations, though only in the colour of its ſkin. The cruſtaceous inſects, as *Crabs*, *Lobſters*, &c. yearly caſt their ſhells,

shells, as their growth would otherwise be impeded.

The *Scolopendri*, when young, have fewer feet than when they are full grown.

All insects, as soon as they undergo the third change, are arrived at their full growth ; nor do we find any difference in the size of the same species of insect in the same countries, unless, during its caterpillar state, it has not had a sufficiency of proper food.

Swammerdam divided insects, in respect of their transformations, into four classes ;

The *First* contained either such as spring from an Egg, as the *oviparous* ; or such as are perfect at their first production, called *viviparous*, as the Bug, and those of the *Aptera* class.

The *Second* consisted of such insects as are furnished with six feet, but have

their wings for a certain time concealed under a crustaceous skin or covering, which covering being cast off, they become compleatly winged. Such is the Gryllus.

The *Third* class included such as pass through three several stages, and which, upon turning to the Chrysalis state, evidently cast off a coat or skin. In this class were two divisions: the first comprehended such as in the Chrysalis state have visible feet and wings, which were called *Nymphæ*, as Bees; the second such as in the same state have their feet and wings covered or invisible. These were specially termed *Chrysalides*, as Butterflies.

The *Fourth* class contained those insects, which in changing to their Chrysalis or Nympha state, do not cast their outer coat or skin; but their bodies
shrink ing

shrinking from it, it surrounds them like an Egg-shell, and is detached from the insect itself, while it continues in this state, till at length it bursts, and excludes it completely winged. Such is the case with many Flies.

The classes of *Valisnerus* are taken from the plants, waters, earths, animals, and the other habitations of insects.

Reaumur's system of the Caterpillars of Butterflies, is founded on the situation and number of their middle feet, which are inserted into the circular or oval rings under the body; paying a regard at the same to the six anterior horny and posterior membranous feet.

S E C T. IX.

HAVING observed the nature of insects in their several states, it remains that we consider them systematically.

matically. A judicious classification of them gives life and spirit to the science, and makes each insect as it were declare its own name. For this part we are entirely indebted to Linnæus, who first reduced them into certain genera, by giving them distinct characters.

The classes of insects are seven:

1. *Coleoptera*, have crustaceous Elytra, which join together, and form as it were a longitudinal future down the back of the insect. (See explanation of plate 2.)

2. *Hemiptera*, have most commonly their upper wings crustaceous at the base, or of a middle substance between Elytra, which are of a coriaceous, and soft wings, which are of a membranous texture. The upper wings do not meet by any longitudinal future, and the
mouth

mouth is either situated in the breast, or inclining to it.

3. *Lepidoptera*, have four farinaceous wings, which are covered with very fine scales laid over one another. In the mouth is contained a spiral tongue, or at least the rudiments of one.

4. *Neuroptera*, have four membranaceous transparent wings (not farinaceous.) They are with difficulty distinguished from the Hymenoptera by description; but having been once seen, they are easily known. The tail, therefore, in these insects, being without sting, we make use of it the more easily to distinguish this order.

5. *Hymenoptera*. These, besides having four membranaceous wings, have their tail armed with a sting; which, however, is not always made use of to instil poison, but frequently to pierce
the

the bark and leaves of trees, and the bodies of other animals, in which it deposits its eggs, as in the *Cynips*, *Tenthredo*, *Ichneumon*, &c.

6. *Diptera*. This order is easily distinguished from the others, the insects of it having two wings, instead of four; but principally by their Halteres or Poisers, a distinction which excludes the male *Coccus* from this order.

Aptera, is distinguished by having no wings at all.

S E C T X.

THESE classes are again subdivided into different orders:

The *Coleoptera*, are distinguished according to the shape of their antennæ, which are either *filiformes*, *clavatae*, or *setaceae*.

The

The *Hemiptera* are divided into two orders; 1st. those whose mouth is furnished with jaws, or, 2d. formed of a beak, which is either reflected under the mouth, or placed in the breast.

The *Lepidoptera*, according to the shape of their antennæ.

The *Neuroptera*, according to the mouth's having no teeth, having many jaws, having two teeth, or being formed into a beak.

Hymenoptera, according to the sting being either venomous, or harmless.

Diptera, into those which have beaks, and those which have none.

Aptera, according to the number of their feet.

To insert here the *characters* of all the different *genera* which may be found in Linnæus's *Syst. Nat.* would be unnecessary. It will be sufficient to enumerate some new *genera* mentioned by the most

modern systematic writers, that by being acquainted with the subtil distinctions on which they are built, the student may avoid running into confusion. It is among the moderns only that genera of this kind are to be met with, and new names given them. To remove this difficulty, we shall first enumerate the names of those authors which are synonymous with those of Linnæus.

New genera of authors synonymous with these of Linnæus.

<i>Linnæus's Names.</i>	<i>Names of other Authors.</i>
Lucanus	<i>Platyceros</i>
Hister	<i>Attelabus</i>
Byrrhus	<i>Anthrenus Cistela</i>
Mylabris	<i>Laria Scop.</i>
Attelabus	<i>Clerus</i>
Silpha	<i>Peltis</i>
Bruchus	<i>Mylabris</i>
	<i>Ptinus</i>

Ptinus	<i>Byrrhus</i>
Chrysomela	<i>Galericula</i>
Hispa	<i>Crioseris</i>
Cantharis	<i>Cicindela</i>
Buprestis	<i>Cucujus</i>
Carabus	<i>Buprestis</i>
Myrmeleon	<i>Formicaleo</i>
Sirex	<i>Uroceros</i>

New Genera of Authors.

Copris. Scarabæus absque scutello

Bostricius. Dermefutes capecinus

Cistela. Byrrhus Pilula

Rhinomancer. Attelabus rostro pro-
ducto fere Curculionis

Anthribus. Silpha

Bruchus. Ptinus Fur ob spinas thoracis

Melolontha. Chrysomela cylindrica

Altica. ——— saltatoria

Diaperis. ——— Fungorum

Pyrochora. Cantharis

Telephorus. Cantharis

Cantharis. Meloë Alata

Cerocoma. Meloë Shafferi

Notaxis. Meloë Monoceros

Prionus. Cerambyx thoracis margine
denticulato

Stenocoris. Leptura thorace spinosa

Hydrophilus. Dytiscus antennis clava-
tis

Mylabris. Nelydalis minor

Acridium. Gryllus Muticus

Locusta. ——— Tettigonia

Tettigonia. Cicada

Corixa. Notonecta.

Naucoceris. Nepa

Perla. Hemerobius cauda bifida

Libelluloides. Myrmeleon antennis ca-
pitatis

Crabro. Tenthredo antennis clavatis

Pterophorus. Phalaena Alucita

Bibio. Tipula thorace spinoso

Stomoxoides. Asilus bucca inflata

Stratonymus. Musca

Nemotelus.

Nemotelus. Musca

Volucella. Musca,

These genera appear to us to be in a great measure like those which were introduced into botany by the followers of Rivinus. Paying too little regard to nature, they disunited natural genera, on account of the most trifling distinctions. This made their continuance in the science of very short duration; our business here is not to suppose, but to examine, what nature will allow of, and what she will not. Knowledge of this kind, built on opinion only, will not stand. We are therefore to look into the science with great accuracy; and the Larva of the insect, its manner of changing, and other things of moment, are to be known, before we presume to form a new genus, as men of experience will readily admit. Daily experience in botany teaches us that none are more apt to

to form new genera, than those who are the least qualified for it.

Coining of new names, and changing of one old one for another, has been the source of the greatest confusion. Thus, in order to reduce the *Cicindela* and *Carabus* to the same genus, *Buprestis* has been adopted for the generic name; but as that genus had long ago received a very different application, it was changed for that of *Cucujus*.

Again, that the *officinal Cantharides* might be ranged among the *Cerambyces*, the *Cantharides* have been removed from the genus of *Meloë* (to which they naturally belong) and referred to the genus of *Cicindela*; obtaining thus a new name, and so of many others.

Thus, also, to mention no more, how needless and rash was it to separate the *Acridium* and *Locusta* from the genus

nus

nus of *Gryllus*, the *Crabro* from the *Tenthredines*, and the *Mylabris* from the *Necydalis*!

S E C T. XI.

THE trivial names placed under their respective genera will occasion little or no controversy; they are current like money, and of the same utility as the proper names of men, Peter or Paul, &c. Insects living on vegetables should receive their names from the particular plants on which they most-ly feed, as they are preferable to all others. Thus the names of the *Phalæna mori*, &c. are excellent; and when we are able to give such to insects, the old ones are to be discarded. But we are to be cautious of not being too hasty in our judgment in this respect, as insects, when they cannot get their favourite

vourite food, will often eat other plants. Thus the Silk-worm, for want of mulberry leaves, will eat those of lettuce, though it will not thrive so well on them.

Many other instances of the invention of trivial names will be met with in the *Systema Naturæ*, particularly among the Butterflies and Moths. To prevent confusion from the great number of species which constitute the genus of *Phalæna*, they are distributed into sections, and distinguished by the terms of *Bombyces*, *Noctua*, *Geometra*, *Tortrices*, *Pyrallides*, *Tineæ*, and *Alucitæ*. The *Bombyces* and *Noctua*, which are so much alike, that the females of the *Bombyces* are with great difficulty distinguished from the *Noctua*, are named promiscuously.

All those of the Geometræ have their names terminating in *aria* and *ata*, according as their antennæ are *setaceous* or *pectinated*. The Tortrices in *aria*; the Pyralides in *alis*; the Tineæ in *ella*; and the Alucitæ in *Dactyla*; so that it is evident from the termination itself to what section the insect is to be referred.

It were to be wished that similar institutions could be formed throughout the whole science, as here the name itself serves to distinguish the insect.

Butterflies are divided into sections, by the names of Equites, Heliconii, Danaï, Nymphales, and Plebeii.

In such a multitude of Butterflies, the greatest part of which are foreign and extra-european, and to whose food and manner of life we are utter strangers, it was impossible to give significant tri-

vial names. Linnæus, therefore, by way of simile, has taken the names of the Equites from the Trojan history. These consist, as it were, of two troops or bodies; of which one contains the fable, and, as it were, mourning Nobles, having red or bloody spots at the basis of their wings. These receive names from the Trojan Nobles; and as Priam was King of Troy, the most splendid among these bear his name. The other body, ornamented with a variety of gay colours, are distinguished by the names of the Grecian Heroes; and as in both armies there were Kings, as well as officers of an inferior rank, those elegant butterflies, whose hinder wings resembled tails, were distinguished by some royal name. Thus when Paris is mentioned (knowing from history that he was a Trojan, and
of

of royal blood) I find him among those of the first section ; that is, those of a fable colour, spotted in the breast with red, and having their hinder wings resembling tails. When Agamemnon is named, I remember him to be a noble Greek, and find him among those nobles which have variegated and swallow-tailed wings. But when Nereus is spoken of, I readily know him to belong to the last section, with wings having no tails.

The second class, which contains the Heliconii, derive their names from the Muses, as Urania. The names of the sons and daughters of Danaus are bestowed on the third section. And as these species are subdivided into two other sections, viz. the white and parti-coloured, the metaphor is so conducted, that the white ones preserve the

names of the daughters of Danaus, and the parti-coloured ones those of the sons of Egyptus ; so that it is evident from the name itself to what section the butterfly is to be referred.

The names of the fourth section, Nymphales, are taken from various nymphs of antiquity ; and those of the fifth section, Plebeii, are selected from different men among the ancients, whose names are worthy of remembrance ; so that by this means a knowledge of the ancients may be interspersed, and this agreeable science be made doubly pleasing.

Those, therefore, who shall find new Lepidoptera, and give them new names, will do well to follow this method, unless it be apparent what food the insect chiefly subsists on.

Color,

Color. The Colour, which so frequently occurs in other parts of natural history, but more especially in this, cannot be described by words sufficiently expressive, but must be learned from ocular inspection only. On this subject we willingly refer the reader to the *Entomologia Carniolica* of Scopoli; he very ingeniously informs us what mixtures are necessary to produce all the varieties of Colour.

The great diversity in the male and female insects of this class, and more particularly in those of the *Hymenoptera*, occasions great difficulties. It is probable that when we become better acquainted with them, we shall find the number of species to be considerably less, especially of *Tenthredines* and *Ichneumons*.

The mensuration of insects seems to merit some attention, and various authors

thors have accordingly measured the length and breadth of them by lines. An insect that is become perfect, after the first expansion of its wings, continues always of the same size. We are nevertheless liable to many deceptions from it; for if the insect in its Larva state should have been deprived of proper nourishment, it will be less when perfect than others of the same species. It happens, likewise, that the same species of insects varies greatly in size in different countries. Thus the *Silpha Vespillo* in America is twice as large as ours.

To conclude, we would earnestly recommend to those gentlemen whose summer residence is in the country, a farther investigation of the metamorphoses of insects. They would derive much entertainment and rational pleasure from devoting their leisure moments

to

to the bringing up the Larvæ of insects, and attentively observing their various transformations, their œconomy in procuring food, their dexterity in preparing habitations, and every other thing they are engaged in. By this means many insects, and their wonderful properties, which have remained in obscurity from the beginning of time, would be brought to light, more especially if these gentlemen would themselves describe or communicate their discoveries to some academy of sciences. Thus would they at one and the same time enrich the science of natural history, and transmit their names to posterity with honour.

INDEX and GLOSSARY.

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Antennæ, peculiar to insects, 33.
—— definition of them, 34.
—— their supposed use, 35.
—— distinguished from the Palpi, 38.
—— their several forms, 38.
Aptera, the 7th class of insects, 72.
Biennial, continuing for two years, 5.
Caput, the Head, and its divisions, 35.
Coleoptera, the first class of insects, 70.
Colour of insects, 85.
Diptera, the sixth class of insects.
Entomology, the science of insects in general from
ἐντομολογία, insects, and λόγος, a discourse.
Elytra, what, 50.
—— their various shapes, 51, 52.
Gymnoptera, such insects as are destitute of Elytra.
Halteres, or Poisers, peculiar to the class Diptera,
52.
Imago, a name given to insects when arrived at their
last or perfect state, 65.
Insects, a definition of them, 33.
Lepidoptera, the third class of insects, 71.
Lingua, the tongue, 41.
Limbs of insects, their division, 45.
Larva, a name given to insects when hatch'd from
the egg, 63.
Metamorphosis, the changing of insects from one
state to another, 11, 62.
Maxillæ, the Jaws, 41.

N.

Names.

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Os, or Mouth, 40.
Ovum, or Egg, 68.
Orders of insects, 72.
Palpi, what, 40.
Pupa, Linnæus's name for the Chrysalis, 64.
Pectinated, Feathered.
Rostrum, or Proboscis, 41.
Sternum, or Breast Bone, 43.
Stemmata, or Crown, 42.
Spiracula, or Breathing-Holes, 43.
Scutellum, or Escutcheon, 43.
Sexes of insects, 54.
Thorax, the upper part of the Breast, 42.
Tail, and its various kinds.
Wing, its division, 47.
 ——— called plicatilis, &c. according to its
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